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NEW SPECIES FROM THE SANTA LUCIA MOUNTAINS,  
CALIFORNIA, WITH A DISCUSSION OF THE  
JURASSIC AGE OF THE SLATES AT  
SLATE'S SPRINGS

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It is proposed in this paper to give very briefly the results of studies of the invertebrate fauna of the Franciscan slates at Slate's Springs, showing, first, that the fauna is older than the lower Knoxville, which itself is now being placed by many geologists in the Upper Jurassic (the slates, indeed, are much more faulted and metamorphosed than the sandstones of the Knoxville and dip under the Knoxville); secondly, that the fauna is not pre-Jurassic; and thirdly, that the molluscan fossils found at Slate's Springs, and named in this paper, are closely related to the described forms from the Middle Jurassic of Cook Inlet and the Alaska Peninsula, and from the Jurassic of Queen Charlotte Islands.

The locality under discussion is a narrow strip of seacoast extending from Point Sur southward to Slate's Springs, a distance of eighteen miles. About four miles north of the springs, collections of molluscan fossils and a few fragments of plants were made by Dr. H. W. Fairbanks<sup>1</sup> and Mr. F. M. Anderson in 1894. These collections are now in part in the Leland Stanford Junior University paleontological collection, and in part in the collection of the University of California.

It has been the work of the writer to describe and name what are judged to be new species from the above-mentioned collections, and to make note of those specimens which are too poor to serve for the identification of species. The *Sequoia fairbanksi*, described by Fontaine, is the only named fossil from this locality. The pecten from the San Luis formation of Fairbanks, and collected by him from a locality six miles north of Port Harford, San Luis Obispo County, is also described in this paper.

<sup>1</sup> "Geology of the Southern Coast Ranges," *Jour. Geol.*, VI (1898), 551-76.

The tellina here described was found among fossils characteristic of the Lower Temblor on the northern headwaters of San Antonio Creek, Monterey County.

#### SPECIES LISTED AND NAMED FROM SLATE'S SPRINGS

*Pleuromya* (?) *undulata* (n. sp.), L.S.J.U. FIG. 4.

*Grammatodon inornatus* Meek and Hayden.

*Yoldia arata* Whiteaves.

*Nucula* (*acila*) sp.

*Inoceramus lucianus* (n. sp.), L.S.J.U. FIG. 2.

*Alaria fairbanksi* (n. sp.), U. of C. FIG. 1.

*Sequoia fairbanksi* Fontaine.

#### FROM NEAR PORT HARFORD, SAN LUIS OBISPO COUNTY, CALIFORNIA

*Pecten* (*Camptonectes*) *harfordus* (n. sp.), L.S.J.U. FIGS. 3, 5, 6.

#### FROM UPPER SAN ANTONIO CREEK, MONTEREY COUNTY, CALIFORNIA

*Tellina tenuistriata* (n. sp.), L.S.J.U. FIG. 7.

#### DESCRIPTION OF SPECIES

*Pleuromya* (?) *undulata* (n. sp.). FIG. 4.

The specimens in the L.S.J.U. collection closely resemble *Pleuromya* (?) *carlottensis* Whiteaves,<sup>1</sup> but are somewhat larger. The specimen from Slate's Springs is strongly marked by broad concentric grooves, a characteristic not marked in the *P. concentrica* Whitfield and Hovey.<sup>2</sup> The right valve is distinctly convex in front and along the sides, becoming slightly concave at the posterior margin; outline ovate, short and rounded in front, produced and blunt posteriorly. The beaks are situated a distance of about one-fourth from the anterior end, apices wide but not acute. The hinge-line behind the umbones is almost straight, curving slightly upward at the posterior end; ventral margin broadly rounded. The surface is strongly and concentrically ribbed—the ribs separated by deep concave grooves.

Dimensions: Length,  $3\frac{1}{2}$  inches; height, 2 inches; thickness of closed valves,  $1\frac{1}{2}$  inches.

(?) *Grammatodon inornatus* Meek and Hayden.

One nearly perfect specimen of a left valve, several specimens showing middle and anterior end. The characters and dimensions agree with the description of *G. inornatus* by Whitfield.<sup>3</sup>

<sup>1</sup> Geol. Surv. Canada, *Mesozoic Fossils*, I, Pt. I (1896).

<sup>2</sup> *Am. Mus. Nat. Hist.*, XXII (1906), 389-402.

<sup>3</sup> *Geol. Black Hills of Dakota* (1880), p. 359, Pl. 5, Figs. 16-18.

Dimensions: Length, 18 mm.; height, 10 mm.; thickness of closed valves, 5 mm.

Cf. *Yoldia arata* Whiteaves, Geol. Surv. Canada, *Mesozoic Fossils*, I, Pt. III, p. 233, Pl. XXXI, Figs. 4 and 4a.

A single specimen, rather poor, but showing clearly the attenuate posterior end, elongation, strong concentric striations, and shallow concave slope of hinge from beaks to posterior end.

Dimensions: Length, 14 mm.; height,  $6\frac{1}{2}$  mm.; thickness of closed valves, about 4 mm.

*Nucula (acila)* sp.

Shell small, nearly equilateral; subovate,

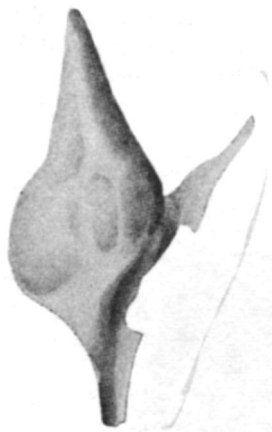


FIG. 1.—*Alaria fairbanksi*, natural size.



FIG. 2.—*Inoceramus lucianus*, one-half natural size.

moderately convex but depressed toward basal margin. Ribs divaricate from imaginary line running from beak to basal margin slightly anteriorly. Extreme length of shell from 7 to 15 mm. The wide range and common characteristics of the *Nucula (acila)* give it little determinative value.

*Inoceramus lucianus* (n. sp.), FIG. 2.

Several imperfect and broken specimens are in the L.S.J.U. collection. The one giving the best conception of the type is a cast of a left valve. The form is ovate or subquadrate, cardinal margin straight, basal margin semi-circular. The beaks are rather low but pointed. The ribs on the type specimen are flattened by the pressure to which the rock has been subjected, but

other specimens show broad unequal concentric folds, often deep, as in the case of *I. elliotii* Gabb.

Height,  $4\frac{1}{2}$  inches, is slightly greater than the length,  $3\frac{3}{4}$  inches. This inoceramus is not of the catillus type.

This species resembles *I. vancouverensis* in general size and outline, and in the direction of the hinge-line.

*Alaria fairbanksi* (n. sp.), FIG. 1.

A single imperfect specimen is in the paleontological collection of the University of California, and was collected by Dr. H. W. Fairbanks. The expanded outer lip and turreted form suggest the *Alaria*, a species of which occurs in the Vancouver Coal Measures.<sup>1</sup>

Dimensions: Height 55 mm.; thickness, about 20 mm.; extension of lip beyond shell proper, 15 (?) mm.

*Sequoia fairbanksi* Fontaine, *Mon. 48*, U.S.G.S. (1905), p. 78, Pl. XLV, FIGS. 9-11.

"From the Jurasso-Cretaceous of Slate's Springs, California. Collected in the rocks underlying the Knoxville group of the Lower Cretaceous. This

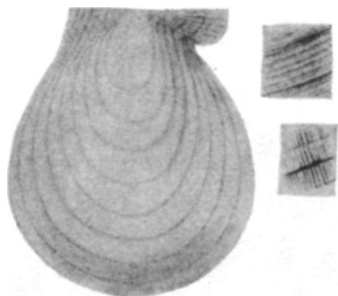


FIG. 3.—*Pecten* (*Camptonectes*) *harfordus*, twice natural size. (The details are four and eight times natural size.)

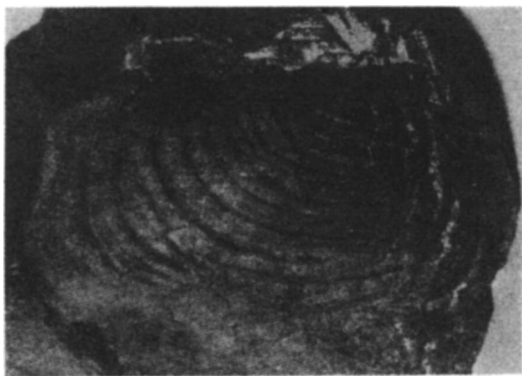


FIG. 4.—*Pleuromya undulata*, one-half natural size

plant is not unlike those from the Jurassic called by Heer, *Elatides*" (*op. cit.*). *Pecten* (*Camptonectes*) *harfordus* (n. sp.), FIGS. 3, 5, 6.

<sup>1</sup> Cf. *Anchura stenoptera* Goldfuss (sp.) Whiteaves, Geol. Surv. Canada, *Mesozoic Fossils*, I, Pt. II, p. 123, Pl. 15.

A small thin pecten; form ovate, nearly smooth, and marked with fine almost microscopic groovings which radiate from the umbo and are deflected laterally from a median line on each valve. The shell is marked also by fine concentric lines, every fifth or sixth of which is more distinct. The anterior auricle is large; the anterior edge forms a right angle with the cardinal margin,



FIG. 5

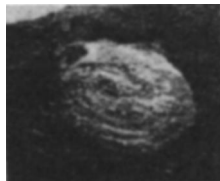
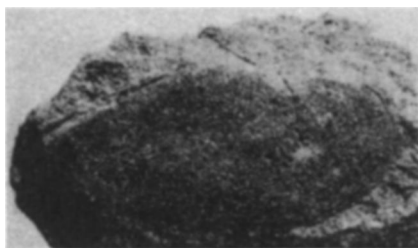


FIG. 6

FIGS. 5 AND 6.—*P. (Camp.) harfordus*, natural size

and rounds sharply into the deep byssal sinus. The left auricle is small and obliquely truncated. The beaks are sharp and stop at the hinge-line.

This pecten is compared by Stanton<sup>1</sup> to *Pecten pedroanus*, but the latter differs from these specimens in having stronger radial markings especially on

FIG. 7.—*Tellina tenuistriata*, natural size

the auricles, and in general outline. It is like *P. bellistriatus* in its sculpture but is smaller; it has finer markings than *P. extenuatus* Meek.

*Tellina tenuistriata* (n. sp.), FIG. 7.

The specimens collected by the writer are from the Lower Temblor on the northern San Antonio headwaters, Monterey County, Cal. They are characterized by the fine concentric lines on both valves, and low beaks. The valves are rounded in front but are oblique and gaping behind; more or less rostrate.

Dimensions: Length, 2 inches; height,  $\frac{7}{8}$  inch; thickness,  $\frac{1}{2}$  inch.

<sup>1</sup> U.S.G.S., *San Luis Folio*.

## CONCLUSIONS

First: The slate formation at Slate's Springs dips unconformably under the basal Knoxville beds, as described by Dr. H. W. Fairbanks.<sup>1</sup> The lowest Knoxville may be assigned to the Jurassic.

Second: The species from Slate's Springs are very similar, and in five instances out of seven are practically identical with described Jurassic forms. None of the species are unlike Jurassic forms. The *Alaria* shows that the beds are probably not pre-Jurassic.

Third: Five of the seven species listed from Slate's Springs are identical, or nearly identical with species described from the Queen Charlotte Islands. The Queen Charlotte Islands beds have been definitely correlated by Stanton<sup>2</sup> with the Enochkin formation of Alaska, which is called (Upper) Middle Jurassic.

Finally: The foregoing facts seem to place the Slate's Springs (Franciscan) beds not higher than the lower Upper Jurassic.

<sup>1</sup> "Geology of the Southern Coast Ranges," *Jour. Geol.*, VI (1898), 551-76.

<sup>2</sup> "Mesozoic Section on Cook Inlet and Alaska Peninsula," *Bull. Geol. Soc. Am.*, XVI, 391-410.